WHAT IS CLAIMED IS:

1. A polymer gel electrolyte composition comprising a crosslinked polymer network matrix having a three-dimensional crosslinked structure containing a solution of an electrolyte in a non-aqueous solvent, and a non-crosslinked polymer included in the crosslinked polymer network matrix, wherein the non-crosslinked polymer comprises (a) an ethylene unit and/or propylene unit; and (b) an unsaturated carboxylic acid unit having a carboxyl group esterified by a polyalkylene glycol having one terminal hydroxyl group protected.

2. The composition according to claim 1, which contains 1 part by weight of the non-crosslinked polymer, 0.1 to 2 parts by weight of the crosslinked polymer matrix and 3 parts by weight or more of the electrolyte solution.

3. The composition according to claim 1, wherein the polyalkylene glycol is a polyethylene glycol, a polypropylene glycol or a polyethylene/propylene glycol.

4. The composition according to claim 1, wherein the non-crosslinked polymer further contains a third copolymerizable monomer unit in an amount of 30% by mole or less.

5. The composition according to claim 1, wherein the non-crosslinked polymer is obtained by reacting

a polyalkylene glycol compound having one terminal hydroxyl group protected, with a precursor polymer containing the ethylene unit and/or propylene unit and unsaturated carboxylic acid unit.

6. The composition according to claim 1, wherein the non-crosslinked polymer has a weight-average molecular weight of about 2,000 to 800,000.

7. The composition according to claim 1, wherein the non-crosslinked polymer contains the ethylene unit and/or propylene unit in an amount of 50 to 95% by mole.

8. The composition according to claim 1, wherein the crosslinked polymer matrix is constituted by crosslinkable monomers having two or more reactive functional groups selected from the group consisting of vinyl group, epoxy group, amino group, amide group, imide group, hydroxyl group, methylol group, carboxyl group and isocyanate group.

9. The composition according to claim 1, wherein the electrolyte solution contains the electrolyte in an amount of 0.1 to 3 moles/liter.

10. The composition according to claim 1, wherein the non-aqueous solvent is at least one aprotic solvent selected from the group consisting of a carbonate ester, a lactone, a sulfolane, N-methylpyrrolidone and trimethyl phosphate.

11. A method of producing a polymer gel

electrolyte composition, comprising subjecting a reaction mixture comprising a solution of an electrolyte in a non-aqueous solvent, which dissolves a non-crosslinked polymer comprising (a) an ethylene unit and/or propylene unit and (b) an unsaturated carboxylic acid unit having a carboxyl group esterified by a polyalkylene glycol having one terminal hydroxyl group protected, and which is added with a crosslinkable monomer, to a reaction condition under which the crosslinkable monomer is crosslinkingly polymerized.

12. The method according to claim 11, wherein the reaction mixture contains 1 part by weight of the non-crosslinked polymer, 0.1 to 2 parts by weight of the crosslinked polymer matrix and 3 parts by weight or more of the electrolyte solution.

13. The method according to claim 11 or 12, wherein the non-crosslinked polymer contains the ethylene unit and/or propylene unit in an amount of 50 to 95% by mole.

14. The method according to claim 11, wherein, as the non-crosslinked polymer, a polymer obtained by esterifying a precursor polymer containing the ethylene unit and/or propylene unit with a polyalkylene glycol having one terminal hydroxyl group protected, is used.

15. The method according to claim 14, wherein the esterification is carried out until an amount of unreacted carboxylic acid in the precursor polymer

becomes 5% by weight or less, in terms of acrylic acid.

16. The method according to claim 14, wherein the non-crosslinked polymer is used after a content of the unreacted polyalkylene glycol after the esterification becomes 10% by weight or less by removal of the unreacted polyalkylene glycol.

17. The method according to claim 11, wherein the crosslinkable monomer is crosslinkingly polymerized by heating, ultraviolet ray irradiation or electron beam irradiation.

18. A method of producing a polymer gel electrolyte composition, comprising applying a reaction mixture comprising a solution of an electrolyte in a non-aqueous solvent, which dissolves a non-crosslinked polymer comprising (a) an ethylene unit and/or propylene unit and (b) an unsaturated carboxylic acid unit having a carboxyl group esterified by a polyalkylene glycol having one terminal hydroxyl group protected, and which is added with a crosslinkable monomer, to a substrate; and subjecting the crosslinkable monomer to a reaction condition under which the crosslinkable monomer is crosslinkingly polymerized, thereby producing a polymer gel electrolyte composition integrated with the substrate.

19. The method according to claim 18, wherein the substrate is made of a porous thin film, and the reaction mixture is impregnated into the porous thin

film.

20. The method according to claim 18, wherein the substrate is made of an electrode material formed into a sheet.

21. An electrochemical device comprising the polymer gel electrolyte composition according to one of claims 1 to 10.